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Biomechanical comparison on the rigid and dynamic stabilization of unilateral spinal fixation

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In this study biomechanical properties of the unilaterally fixed spinal segments for minimally invasive applications were studied. Alternative to the bilateral fixation unilateral fixation was investigated under two main considerations. First, it was tried to decide the most anatomically similar fixation system. In other words, main hypothesis of this study is using dynamic stabilization systems to mimic the natural anatomical responses of vertebrae for unilaterally spinal fixations. So that Biomechanical comparison was carried out between rigid and dynamic unilaterally fixed segments. Two different dynamic systems were used namely, PEEK rods with polyaxial pedicle screws and dynamic rods with dynamic pedicle screws. Secondly, in order to understand the effect of facetectomy, only facetectomy applied segments were compared with intact spinal segments which are non-implanted and non facetectomy applied. Additionally, results of the intact models were also accepted as base for dynamically fixed segments. Fresh frozen ovine vertebrae were used on biomechanical tests as a testing medium. Flexion extension, lateral bending and rotation tests were conducted to each fixed system in our clinical biomechanics laboratory. Student t-test was applied to understand weather the results of two groups are significantly different or similar to each other, statistically. According to the test results, facetectomy applied segments were exhibited significantly lower results when compared to intact and fixed systems and PEEK rod used system exhibited the most similar results with intact model under flexion-extension, lateral bending and rotation.

Biography

Teyfik Demir completed BSc at Selcuk University, Department of Mechanical Engineering in 2005. He gained his MSc and PhD degrees from TOBB University of Economics and Technology, Department of Mechanical Engineering in 2008 and 2011, respectively. His field of research can be listed as spinal biomechanics, biomechanical tests and implant design. He was listed between "top 40 medical innovators under the age of 40" by medical device and diagnostic industry, London in 2012. In 2013, he became the youngest Associate Professor of Turkey in field of Mechanical Engineering.

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